CLINICAL AND OTHER METHODS OF MEDICAL PRACTICE AND RESEARCH.

BY

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In considering the „Clinical and other Methods of Medical Practice and Research" it may first be pointed out that too rigid a distinction between practice and research is both unnatural and harmful; every case is one for research, and the difference between the laboratory worker and the practising doctor is that the former devotes himself to the complete solution of one problem, while the doctor attempts to solve a large number of perhaps more difficult problems in the course of the day's work, and often has to be content with but partial explanations.

The last 75 years have been roughly divided into three periods of about 25 years each according to the predominant line of research underlying the practice of clinical medicine; thus (I) the third quarter of the 19th century was pre-eminently that of morbid anatomy and of the intensive study of physical signs, (II) the last quarter of the century was remarkable for the influence of etiology due to the rise of bacteriology and the experimental method, and (III) since the early years of this century the investigation of disturbances of function has taken the lead. These periods are in no way sharply cut, or indeed characterized by exclusion of the influence of factors previously prominent or of the germs of new ideas. Thus before the period of morbid anatomy, symptoms had always received some attention, as they rightly do now; and physical signs are not yet, and should never be, discarded, even though etiology and disorders of function may give more attractive promise of future advance.

I. *The Era of Structural Change and Physical Signs.*

Morbid anatomy, founded by MORGAGNI (1682—1772) and carried on by F. X. BICHAT (1771—1802), LAËNNEC (1781—1826), LOUIS (1787—1872) and MATTHEW BAILLIE (1761—1823), was so systematised by VIRCHOW's doctrine of cellular pathology (1858) that it came to occupy a dominant position in medical research during the third quarter of the nineteenth century and indeed has continued to exert a most valuable influence by providing that accurate knowledge of what does happen in disease which

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is so essential for a due sense of proportion in diagnosis. It was once said that „no consulting physician ever recovered from not having been a resident house physician" and to this might be added „and from having omitted to serve a long practical apprenticeship in the post-mortem room". The prominent position formerly held by the study of morbid structure in the third quarter of the last century was no doubt favoured by the more advanced state of normal anatomy as compared with physiology; for morbid anatomy is the corollary of normal anatomy just as morbid physiology (pathology) depends on our knowledge of function in health. The study of structural lesions was a necessary step to the development of bacteriology (etiology) and of disorders of function, just in the same way as normal anatomy underlies a proper grasp of physiology. It should be remembered that VIRCHOW and COHNHEIM broadened the scope of pathology by applying to it the methods of physiology and chemistry.

The attractive study of bacteriology and of the disorders of function has now so widely distracted attention from the investigation of morbid structure that there is considerable danger of the „passing of morbid anatomy" because the clinical worker no longer takes the same keen interest in necropsies that his predecessors did; this has certainly occurred in America, where basal metabolism is much in favour; for example, in the thirty-eight hospitals in Chicago the percentage of necropsies among fatal cases was 15 in 1921; in nine of these hospitals the percentage was over 20; whereas in ten hospitals receiving general medical and surgical cases there were 852 deaths but only 21 necropsies or 2.5 per cent. In the latter hospitals there can be little doubt that opportunities for the improvement of professional work and the benefit of patients generally are lost.

During the era of the study of morbid structure there was developed the use of the *numerical method in medicine*, so laboriously and successfully initiated by LOUIS following the suggestion of the astronomer LAPLACE. This method forms one of the great props of medical knowledge and its influence is obvious in all modern books on medicine and is essential to the solution of numerous problems. It checks theories, however brilliant born of the imagination only, and controls hasty generalization from insufficient data, but the statistical method has its limitations. The data on which its results are based must be carefully scrutinized and the cases selected for analysis must be all alike, otherwise erroneous conclusions will inevitably arise; thus, to take an example if 100 cases resembling each other in so far that all presented headache, though differing in their etiology, are treated with iodide of potassium, the conclusion that such and such a proportion were thus cured would be valueless without the further information as to the underlying causes or complicating factors. Further, in the past it was not sufficiently recognised that to be a collector and analyser of statistics requires a special training; neglect of such precautions has supplied justification for the reproach that „statistics will prove anything" and perhaps for

the second Sir ROBERT PEEL's paradoxical epigram „nothing is so misleading as facts except figures". Too great reliance on statistics has the drawback that the individualty and idiosyncrasies of the patient may be neglected in obedience to the general law, and that careful examination of each case may be slurred over on the assumption that it will probably conform to the common type.

Within the last 20 years the application of biometric methods, devised by KARL PEARSON and his pupils, to medical problems has created a new school of research, and in the hands of MAJOR GREENWOOD and JOHN BROWNLEE has thrown light on some of the most difficult aspects of epidemiology and etiology. It is interesting to note that RAYMOND PEARL has begun the use of new biometric methods in pathology; he proposes by utilizing data from necropsies to investigate the specific vital resistance and its converse specific pathopoiesis of the individual; for he believes that the innate constitution of the host is at least as important as is the infecting organism in the etiology of disease, and probably much more important than any or all of the external agents in the etiology of so-called organic disease. By taking the relation between the weights of any two organs the functional balance between them and the compensatory functional adaptation that occurs in disease is investigated. Thus answers will be sought to questions such as the following: is the ratio liver weight: heart weight, on the average, different, and if so by how much, in a group of persons found on post-mortem examination to have as the primary lesion pulmonary tuberculosis, from that in a group with endocarditis as the primary lesion?

Another method of clinical investigation involving the use of statistics, which, though entailing long and tedious labour, has a future before it, is that inaugurated by Sir JAMES MACKENZIE at his Clinical Institute at St. Andrews in Fife, Scotland. This ancient borough has a population of 10,000 inhabitants who are less migratory than those in large towns and so can be watched; a careful record of all the symptoms in the early stage of functional disorder, long before any structural change has occurred, or at any rate is obvious, can thus be obtained; with this record any future development can be correlated. As an accompaniment of this, the environmental conditions can be noted and the science of ecology, or the study of the relation of the living organism to its surroundings, can be applied to human beings, as it has been utilized in botany, thus employing the methods of sociology on a wider scale. DANA has recently urged a thorough trial of ecological methods to throw light on the etiology of disseminated sclerosis. A laboratory development allied to this is that of experimental epidemiology which is being pursued at the ROCKFELLER Institute with a view of obtaining those precise data of both micro-organism and host on which eventually a real science of epidemiology may be based. Experimentally epidemics on laboratory animals can be studied under conditions of control not possible in human conditions, and the results cannot fail to be of value; though

whether they will prove to be decisive or not, is open to question because they do not reproduce the factors of atmospheric, terrestrial or other nature, which, by acting on the bacteria or their hosts, are by some held to be responsible for the phenomena of epidemics. There has indeed recently been a reaction from the view that epidemiology can be explained solely in terms of pathogenic bacteria, and there has been a tendency to regard epidemiology as depending on less obvious and somewhat mysterious influences, such as were implied by SYDENHAM's term epidemic constitutions.

An important practical application of morbid anatomy to clinical medicine was the general introduction of physical signs or of local diagnosis. As far back as 1761 AUENBRUGGER of Vienna wrote a book — *Novum inventum* — on percussion as a means of detecting intrathoracic disease, but it did not attract any attention until CORVISART translated it from the Latin into French in 1808. Then LAËNNEC, a pupil of CORVISART and a keen morbid anatomist, discovered auscultation (1819), and PIORRY (1794—1779) the inventor of the plexímeter, did much to bring these methods into popular use. This was a decided step in advance; but its general adoption was slow; in the preface to the translation of LAËNNEC's *L'Auscultation médiate* (1821), dedicated to MATTHEW BAILLIE who wrote the first book in English on morbid anatomy, Sir JOHN FORBES said that the general adoption of this method was extremely doubtful, and it may be interesting to quote the opinion of Sir HENRY HALFORD, delivered on the death of MATTHEW BAILLIE (1823), as an example of what must at that time of transition have appeared a particularly broad-minded appreciation by a man whose education dated from a time antecedent to this new knowledge — „He (BAILLIE) appeared to lay a great stress upon this information which he might derive from the external examination of his patient and to be much influenced in the formation of his opinion of the nature of the complaint by this practice. He had originally adopted this habit from the peculiar turn of his early studies; and assuredly such a method, not indiscriminately but judiciously employed, as he employed it, is a valuable auxiliary to the other ordinary means used by a physician of obtaining the knowledge of a disease submitted to him. But it is equally true that, notwithstanding its air of mechanical precision, such examination is not to be depended upon beyond a certain point". The study of physical signs had the conspicuous advantage that it concentrated attention on the patient and necessitated contact with the individual sufferer, in place of the traditional respect for metaphysical dogmas handed down from the times of CELSUS and GALEN.

The period during which morbid anatomy was predominant and physical signs were keenly studied was one of great vigour, for it was based on definite objective evidence and thus contrasted with the more difficult problem of the assessment of symptoms. Physiology was less developed than anatomy and accordingly the domain of symptoms was relatively neglected — a point

of view that has held the field up to very recent years. The era of morbid anatomy dealing with what have been called the end-results in the dead house, tended to breed among its followers an honest scepticism as to the value and effects of treatment, and the reproach of therapeutic nihilism has not infrequently been made against them. By focussing the mind on the morbid process rather than on the patient's symptoms which, when not compatible with the interpretation thought probable, were sometimes relegated to oblivion, it certainly exalted diagnosis above treatment and thus, perhaps unconsciously, strove more energetically for the discovery of truth than for the benefit of the patient; in other words, the science was more to the fore than the art of medicine.

The long experience derived from observation by the trained but unaided senses and from physical examination of patients, supplemented by post-mortem inspection of fatal cases, was of the greatest value in leading to the acquirement of clinical instinct — a kind of subconscious X-ray diagnosis and prognosis; how he arrived at his decision, the possessor of this personal faculty was often unable to explain. Being thus intuitive rather than logical, this mental process was obviously open not only to criticism as a jump to conclusions without any scientific basis, but to imitation by those who had not gone through the necessary extended apprenticeship to the employment of facial diagnosis which, though sometimes attractively successful, may be dangerous from the numerous fallacies by which it is attended. Such apparently rapid diagnosis may also depend on keen observation and conscious ingenious induction recalling the detective methods of SHERLOCK HOLMES whose creator, Sir CONAN DOYLE, based his description on the practice of an Edinburgh surgeon, JOSEPH BELL. It should be mentioned that in 1892 Sir LAUDER BRUNTON in an interesting address on „The Method of ZADIG in Medicine" applied the method ascribed by VOLTAIRE to his character ZADIG, to medical diagnosis, just as previously HUXLEY (1880) had to some pure sciences. Towards the end of the last century it gradually became recognised that the symptoms in chronic disease were not so much a result of structural change in the organs and tissues, as that the morbid lesions were the end-results of underlying and previously existing factors, of which functional disturbance had been the earliest manifestation; in other words, the causal relation between structural change and symptoms was reversed. The difficulty in reaching this conclusion, which now seems a truism, lay in the frequency with which the existence and nature of the underlying cause were unknown, so that this new conception had to encounter the serious objection that it substituted a hypothesis for a definite structural change which could be shown and, as it has been expressed, „handed round on a plate".

II. *The Era of Etiology and Clinical Pathology.*

The study of gross morbid change, when carried further into minute structural alterations by the aid of the microscope, led

to the discovery and study of micro-organisms, and thus to the advent of bacteriology, due to the epoch-making work of PASTEUR, LISTER and KOCH, which brought in the period of scientific etiology and revived the experimental method of the ancient Greeks. The descriptive stage of medical science was thus gradually superseded by the experimental stage; and the advent of sound etiological knowledge rendered the greatest service to preventive medicine. Laboratory methods, previously almost confined to morbid microscopy, testing urine, blood and sputum, were much extended; the pathologist began to take his share in the investigation of the living patient and his activities were no longer limited to the post-mortem room. In other words clinical pathology gradually developed; it was then for a short time part of the armamentarium of the clinician; but more complicated methods gradually came into use, and as a necessary consequence they became more and more the province of men who devoted their whole time to this special branch of work in a laboratory. The clinical pathologists thus tended to become specialists, and their outlook altered, just as did that of the teachers of anatomy, physiology, and pathology, when the change from part to whole-time service became general. The adoption of scientific methods leads the worker to eliminate, as far as possible, all complicating factors such as inevitably surround clinical investigation, and to simplify the problems and guard against errors of chance so that crucial experiments can be carried out in the laboratory. But this altered environment, both mental and occupational, resulted in some degree of isolation and loss of touch with the needs and limitations of practical medicine. For working on logical and scientific lines these investigators naturally attacked the problems of medicine in the same spirit as those of the exact sciences, and thus there was a tendency to lose sight of the other side of its shield, namely that it is also an art.

Relations of Clinical and Laboratory Workers. Now science and art are closely connected, but their objectives differ; each has its own sphere; thus the organic chemist may supply the artist with pigments and synthetic aniline dyes, but he is not on that account capable of painting a masterpiece. Similarly the bacteriologist may supply the information that a definite micro-organism is present in, say, the sputum of a patient, but it is for the clinician to determine how the individual is reacting to the infection and then, in consultation if need be with the bacteriologist, to arrive at the proper course of treatment. For it is the patient and not the infection that has to be dealt with. The laboratory worker should always be supplied with the clinical details when he is asked to report on the blood, secretions and so forth of a patient, otherwise he is in a false position, and his opinion is deprived of much of its potential value. By combined action, mistakes, ludicrous when they are not serious, can be avoided; it would be easy to quote examples of how purely laboratory examination may fail for want of clinical direction; thus, to take a comparatively trivial instance, a practising bacteriologist, finding *Staphylococcus aureus*

in small pustules between the fingers, might prepare and administer a vaccine to a patient with scabies. A patient with obvious malignant endocarditis may as a result of antityphoidal vaccination give a postive Widal reaction, and the laboratory worker, unless in possession of the history and condition of the patient, might give a diagnosis of enteric fever. About 25 years ago I read a clinical lecture on the relative value of microscopical and clinical diagnosis of tumours by a senior surgical colleague, which was apparently based, in part at least, on mistakes, or at any rate on opinions seriously differing form the ultimate outcome, made by myself when pathologist to the hospital. On the other hand a physician without bacteriological assistance is in frequent difficulties as to the exact nature of the disease that he has to treat.

The different circumstances of laboratory and clinical investigation, therefore, are important in considering the relations of laboratory and clinical workers. Laboratory observations usually yield a definite and unambiguous answer and in this respect are often apparently superior to the results of clinical examination; but for this reason their conclusions cannot be unhesitatingly and exclusively employed in the interpretation of clinical problems, which are far more intricate and therefore far more difficult of solution. There is indeed the danger that the clinical worker, disappointed by his failure to solve the complicated problems presented by symptoms, may be led to excessive dependence on instruments of precision and methods borrowed from the ancillary sciences, such as X-rays, and so come to neglect strictly clinical observation and examination. He may naturally be tempted to save himself the thought, labour and time necessary for the cultivation of visual and physical examination and for the careful analysis of symptoms, in favour of a short cut to diagnosis provided by a laboratory test. There is the same danger in relying too implicitly on instruments of precision, for by „the practice of medicine by machinery," as it has been called, the patient's personality may be lost sight of, though the recent expansion of the confessional method, viz., psychoanalysis, has perhaps gone to the opposite extreme.

The methods of physiology, bacteriology, serology, and psychology cannot be substituted for those of the practice of medicine, or as a rule at once applied to it without a process of mutual accommodation and compromise. Laboratory methods are not immune from errors due to the personal equation, and their value in application to medical practice requires patient investigation and control. Medicine is not yet an exact science, though it is an outstanding example of the advantages accruing from applied science. How successful the adoption and utilization of scientific principles may, after due trial and estimation of their significance, become in ordinary practice is too obvious to require prolonged illustration; it may suffice to point out that the science of physics forms the basis of ophthalmology and otology. But it should be borne in mind that just as the exact sciences have their special methods, so too are there methods peculiar to, and limitations imposed by,

the practice of medicine. As already mentioned, the complex conditions in disease differ from the carefully arranged circumstances of a laboratory experiment. The patient's environment, individuality, idiosyncrasies, and reactions must be taken into account in applying a general law dictated by laboratory investigation, and in this matter the medical attendent must be the judge. A medical man should be a physiologist and a pathologist so far as to be able to form an expert opinion on the significance of laboratory findings in his patients, and on the exact mechanism by which effects of pathogenic agents and of remedies are produced, but he must be something more, and this something is provided by his clinical observation and experience. Without this he is wanting in his complete equipment, and is no more fit to practise than is a pure physiologist, pathologist or pharmacologist. The medical man's wards and sick rooms are his laboratory, he deals with men rather than microbes and should therefore be a humanist.

But, finding that they provided clinicians with exact information and often with a diagnosis and so with the logical treatment for the cure of the disease, it was only natural that some of the laboratory workers should become convinced that they were the only competent pilots in a hitherto uncharted sea. Among some of them a feeling of superiority and even contemptuous pity for the efforts of the clinicians grew up; this position was expressed, no doubt in rather exaggerated terms in 1912 by a witness before the Royal Commission on University Education in London: „I do not know a solitary physician who is famous, apart from the neurologist, for his original work". Hear also what Sir ALMROTH WRIGHT saith, „All inquisition into the causation of pathological events, and into the efficacy of treatment — in other words, in all medical research — adjudication by empirical methods, i.e. by observation unaided by apparatus and technique, should be superseded by adjudication undertaken with the help of apparatus and technique".

In the past a somewhat aggressive attitude was taken by some laboratory workers no doubt as a measure of defence against the behaviour unwisely adopted by some ward-workers who were far from showing appreciation of opinions that were new and appeared revolutionary and disturbing to the established order; thus even 40 years ago the „germ theory" was a phrase of derision common in the mouth of "the practical man", and less than 20 years ago I remember hearing a practitioner excuse himself for calling in the help of an expert laboratory worker, who has since become a distinguished consulting physician, to throw light on a case of a doubtful diagnosis, by saying, "These young men are as clever as monkeys". Thirty years ago the position and remuneration of laboratory workers were absurdly inadequate, and opinions that supplied an accurate diagnosis were, at first at any rate, often obtained gratis by prosperous clinicians. As men must live, and even scientific workers are human, these material considerations helped to keep apart those who should be close allies. This, however, was fortunately but a passing phase in the progress of

medicine, and the position of laboratory workers is now fairly generally recognised, especially as many practising medical men have behind them a stage of apprenticeship as laboratory workers, and are therefore fully in sympathy with the position of those who devote themselves solely to the laboratory investigation of patients. As a result the clinician and laboratory worker have come into closer touch, though further development of this equal partnership is desirable.

Twenty years ago the late Sir WILLIAM GOWERS divided the medical profession into two groups, those whose work was mainly in applying knowledge to their general practice, and those whose work was chiefly in advancing knowledge, and at that time he appeared to regard consultants with hospital facilities as in this position. Since then it has been urged that research for the advance of medicine should be left to the laboratory worker; but this is a narrow and myopic view, for there is plenty of scope for workers in the wards as well as for those in the laboratory, and the best plan is combined or team work. Further, as Sir JAMES MACKENZIE has insisted, it is the general practitioner who has the opportunities for clinical research into the early stages of disease, before the patient's disability is sufficient to take him to hospital, and so has to his hand the key enabling him to recognize disorders when prevention is still possible.

III. *Era of the Study of Disorders of Function.*

The advance of physiology and of its developments, experimental pathology 1) and experimental pharmacology, has had a most beneficial influence on the scientific aspect of medicine, and at the present time the study of disorders of function has naturally attracted research workers from the study of structural change as revealed by physical signs and post-mortem examination. This study has taken place in two directions: (I) by laboratory methods mainly on chemical or bio-chemical lines, such as investigation of metabolism, and (II) by clinical examination of the patient in various ways; (*a*) physically, the functional efficiency of the organs, such as the heart, kidney, liver, pancreas, often involving the methods of laboratory origin just mentioned, but made applicable at the bed side, (*b*) careful examination of the patient's symptoms, sensations and psychology, conducted on systematic lines, with investigation of the mechanism by which the symptoms are produced, so as to arrive at the first indication of a departure from health. In this way the earliest stage, that of symptoms, in a patient's illness can be correlated with the later stage of physical signs and finally with the morbid lesions. Advance

1) With this should be combined comparative medicine and pathology, which, though foreshadowed by CHARLES DARWIN, advocated more than forty years ago by Sir JAMES PAGET (1881) and since then persistently by Sir CLIFFORD ALLBUTT, has been strangely neglected, for it is obvious what an important bearing this comparative study would have on medicine in all its aspects and especially on preventive medicine.

in our knowledge of the prognostic significance of disorders of function as manifested by symptoms will obviously be of the greatest value in the real object of medicine, namely the prevention rather than the cure or arrest of disease. Thus when dealing with a neurosis it is essential, instead of merely treating the clinical symptoms by drugs, such as bromides, to consider and, if possible, obviate the circumstances responsible for the disorder, as has been done by the social service and follow-up system introduced by R. C. CABOT into the outpatient departments of the Massachusetts General Hospital, Boston, and other hospitals in America and also employed by Health Visitors, especially as regards children and tuberculosis, in England. The study of disorders of function which marks the advent of the most rational basis for preventive medicine, contrasts with the earlier era of physical signs when curative treatment was the most that could be anticipated as the outcome of diagnosis.

All the methods thus briefly mentioned have their proper place in medical research and their applications likewise ~~from~~ the basis of medical practice. Clinical examination of the patient has thus become a complex process calling for the combination of several methods originally more or less distinct; in the machine thus utilized one of the parts may become more prominent for a time and by its popularity cast the others into the shade; in TENNYSON'S words, „our little systems have their day". In the progress of medicine there is side by side with new methods, such as bacteriology and X-rays, a tendency for old ideas and doctrines to come up again, though in somewhat modified forms and occasionally under new names.

Organization of Research.

Up to recent times researches advancing medical knowledge have been largely due to individual and isolated effort, and the outcome of private initiative. But even before the War team work among individuals was a recognized method of investigating a problem requiring experts on various aspects of the same subject, and in some instances such groups of research workers were appointed and financed by Government Departments or institutions, for example, commissions on tuberculosis. During the War this method was naturally much employed, especially in England, by the Medical Research Committee, and how valuable such co-operative investigation may be was proved conclusively. The endowment of research, while obviously beneficial, must also be carefully considered from the worker's aspect, so that his freedom is respected, and that results are not expected to be provided at a price.

The Professorial Unit System. The teacher or Professor of Medicine in a University has in the past differed from most other professors in not being a whole-timer; part of his day was devoted to attendance, teaching, and research in his hospital wards and laboratories and the remainder to private practice in

order to supplement his income. Often indeed his professorial position provided a most favourable opportunity for gaining a satisfactory income and thus compensated for his barely living wage *qua* teacher; the struggle between the service of the God of teaching and research on the one hand and the Mammon of financial success on the other hand, sometimes resulted in the triumph of the more lucrative field of activity. As medicine became more complex, the increasing calls on his time demanded by hospital practice, teaching, and administration, and by private patients often made it difficult for him to keep his knowledge up to date by reading, and any extended research in his wards became almost impossible. With altered circumstances the question of some means of maintaining and improving the standard of medical teaching and research naturally arose, and the institution of whole-time teachers of medicine provided with competent assistants so as to form a professorial unit, was started at the Johns Hopkins Hospital, Baltimore, before the War, and has been adopted in other American Universities and in six teaching hospitals in London. In addition to the care of patients, the objects of these units are to provide teaching of a University standard, to stimulate research and thereby to advance medical knowledge, for which ample time and a living wage should be provided, and to train up teachers of medicine for the future. In such a unit the desired correlation of clinical observation and laboratory work can be more efficiently carried out by students, in as much as the director or his assistants are more constantly available to afford help, than is the case with ordinary visiting physicians and surgeons. In this way any divorce between clinical and laboratory workers is obviated, research is forwarded on the most fruitful and practical lines, and the standard of medical men in the future is bound to be raised, for with this training they would carry into practice and broadcast the ideals and methods on which they were brought up.

Much debate has centred round the difficult problem of the status of the director, whether he should be whole-time and not do any private practice, whether he should have a consulting room in the hospital for private patients but be debarred from work outside, or whether he should be part, say half, time, and have one or more whole-time assistants. Probably many of the objections to the whole-time director — one of the chief being that some of the ablest men will not adopt a career which does not offer the highest pecuniary rewards and that therefore the field for possible directors will be restricted and deprived of some of the most suitable candidates — would be met if the term of office of the Director was limited to a relatively short period — say of ten to fifteen years. During this time he would build up a great reputation, so that he could then look forward to a consulting practice and a dominant position in the profession. For a consulting physician no better training can be imagined than that of a Director of a Clinical Unit, and the influence that such men would exert on the future of the profession would be most beneficial.

The professorial director, if whole-time, should be young and selected not for his name, but for what his career and capabilities promise that he will do, and should be appointed not for life, but for a comparatively short term of years. To be an inspiring teacher of University standard he should be engaged in active research, and should not be overburdened with teaching or the routine of administration. Men well-fitted to carry out research, to teach and to practise medicine are not common, and when found should therefore be given the best chance of effectively accomplishing this task. But while the rarity of the exceptional capabilities necessary for the ideal director must be admitted, it should be remembered that the posts to be filled are few. The clinical unit organisation has not been long on trial, but it gives promise of success; Sir GEORGE NEWMAN mentions that during the last two years more than sixty pieces of original work have been published from the University clinics in London.

Group medicine or group clinic system. The enormous advance of the ancillary and allied sciences in the second half of the last century and their application to medicine resulted in the development of specialism, the drawbacks of which, namely the danger of a narrowed outlook, were, thirty to forty years ago, rather magnified by the general physician and surgeon. Further elaboration of medicine made this necessity for special departments only more obvious; the principle has long been firmly established and has resulted in increased productivity, knowledge, and technical skill, though there is still a risk that it may be carried to excess, and that specialization may be undertaken too early in a medical man's career. But consideration for a moment of only the established and proper specialities, makes it clear that the technique and the knowledge they demand are so extensive that no one man can pretend to master all specialities. In hospitals for the poor this limitation of omniscient ability has long been recognized by the appointment of officers to special departments, and an opinion is freely sought from them in any case outside the immediate province of the physician or surgeon, a co-operative method greatly to the advantage of the patients. This is seen in its most perfect form in a large general hospital provided with a professorial unit, in which the patients are most thoroughly examined in the clinic — an *imperium in imperio* — and then if need be further help is obtained from the special departments. This principle of combined investigation of the patient by a number of specialists was systematically adopted and carried to its logical conclusion by W. J. and C. MAYO at their famous clinic at Rochester, Minnesota, U. S. A., and the phenomenal success that has attended this step has brought in Group-Medicine as an improved method of private practice. Thus the well-to-do can obtain the same advantages as the poor receive in the public hospitals. The idea of course is not new, for consultations and „second opinions" have always been familiar; but the organization of a team of experts in special branches, accustomed to act in collaboration, has produced admirable results both as regards research and from

the patient's point of view; by means of an inclusive fee, whatever the number and scope of the examinations found to be necessary, expense to the patient is kept within a known limit. The same system is thus adopted as in the hospital unit, and indeed is the remedy against the drawbacks of the specialization necessitated by the increasing complexity of medicine. The success of the MAYO Clinic has naturally been followed by imitation, and various forms of combined or team work in private practice have ~~been~~ followed; in some diagnosis alone is undertaken, in others both diagnosis and treatment. As so much depends on the personnel and ideals of those responsible for the organization, the „diagnostic clinics" that have grown up do not all appear to have given satisfaction; Professor W. S. THAYER of Baltimore writes, „The term diagnostic clinic to-day unfortunately covers a multitude of sins". But this is a natural incident in the evolution of any new departure.